A First Course on Kinetics and Reaction Engineering

How To Solve Stoichiometry Problems*

1. Go through the problem statement, and
   a. assign each quantity that is given to the corresponding variable
   b. assign a variable to each quantity you have been asked to calculate
2. Examine all of the quantities given in the problem statement; if no extensive variables are specified, choose one and assume a value for it as your calculation basis
3. For every variable listed in step 1 that is defined in terms of the moles (for a batch system) or the molar flow rates (for a flow system)
   a. write the defining equation and
   b. if the definition includes additional unknown quantities, add those variables to the list from step 1b
      i. if these quantities can be written in terms of the moles or molar flow rates, write the corresponding equations
4. If the number of equations is equal to the number of unknowns, solve the equations to obtain the values of the unknowns
5. if the number of unknowns is greater than the number of equations, write an expression for the number of moles or the molar flow rate of each species present in the system in terms of the extents of the independent reactions and add the extents of the independent reactions to the list of unknowns
6. If the number of equations is equal to the number of unknowns, solve the equations to obtain the values of the unknowns
7. If the number of unknowns is still greater than the number of equations, look for additional relationships between the unknown variables (things like the ideal gas law, Henry's law, etc.)

* There are many, many ways to formulate stoichiometry problems. As such, it isn't possible to formulate a recipe for solving them that will always work. The process given here should work much of the time, but other times you will need to modify it in order to succeed. In general, these problems can be solved by using the information provided to find the extents of the mathematically independent reactions and then, in turn, using those extents to calculate whatever the problem asked for.